ago. To be sure there was the Libri transcription of the translation attributed to Gherardo to help in reading the manuscript, and there was Rosen's translation from the Arabic (1831), but neither of these has the same wording, and neither could render much assistance in the difficult task.

The translation can best be described by the word sensible. It is fortunately not literal, for a literal translation of, say, "substantiæ radices coæquant" or "De substantia et drachmis res coæquantibus" would be unintelligible. Even such an expression as "et etiam si dicas" is better rendered by "another example" than by a verbatim translation. To be sure this freedom leads to inconsistencies, as when "Tria igitur huius substantiæ sunt radix; et substantia nouem" appears as "Therefore three (spelled) is the root of this x^2 (symbol), and x^2 is 9 (symbol)"; while the sentence "Substantia et 21 drachmæ 10 rebus æquiparantur," which follows, appears as "A square (word) and 21 units are equal to ten (spelled) unknowns" instead of, say, "$x^2 + 21 = 10x$." These variations in style are not at all confusing, however, because the student always has the original on the facing page.

The style of the problems of Al-Khowarizmi shows the Greek influence, that is, the questions are generally abstract; for example, "From a square I subtract three of its roots and multiply the remainder by itself; the sum total of this multiplication equals the square"; or, in the shorthand of modern algebra, $(x^2 - 3x)^2 = x^2$. There are, however, a few questions in the rule of three, apparently a product of the Orient, but all are so simple as to deserve no place in algebra.

Al-Khowarizmi can not be said to have made any discovery in algebra. He was essentially a compiler of problems which he solved by methods already known. He invented no symbolism as Diophantus apparently did, nor did he show the remarkable genius of this last great representative of the dying mathematics of a dying Greek civilization. He contributed nothing to the solution of the quadratic that the Alexandrian school had not known, and even the special cases of the cubic equation were as a sealed book to him. His problems lack the delicious imagery to be found in the Hindu schools of his time, and the same is true, oddly enough, of those of the great Persian algebraist and poet Omar Khayyam.

Whatever may be said, however, of the details of the work itself, it is evident that Al-Khowarizmi will always occupy a prominent place in the history of mathematics, and that Dr. Karpinski's publication will rank as the first noteworthy effort in our country in the editing of a renaissance manuscript on the subject of algebra. The thanks of all scholars are due to him for his careful work and to the University of Michigan for publishing the result in such a satisfactory style.

DAVID EUGENE SMITH

Fungoid Diseases. An English-American Book. London, Longmans, Green and Co. 118 pp. Price 65c.

The latest book on fungi to come to hand is a pleasing little volume by Thomas Milburn and E. A. Bessey, entitled "Fungoid Diseases of Farm and Garden Crops." The title betrays its English origin, for if written in America it would have been called "Fungous Diseases" or perhaps by a select few "Fun*gus* Diseases." The English have not the reputation of being so far advanced as Americans in the application of remedies for fungous diseases, yet when it comes to writing general semi-popular books on the nature of fungi they lead them by many volumes, as represented by those published by Berkeley, Smith, Cooke and Massee.

The volume under consideration, more than any of its English predecessors, puts stress on practical treatment. As partially indicated by the title, it does not discuss the diseases of fruits, but rather those of cereals, legumes, root crops and certain vegetables, with a short chapter on fungoid diseases of animals. This limits its usefulness for a wide class of readers, especially in this country. The descriptions are popular, followed in each case by a paragraph on preventive measures. The book was written "primarily for the use of farmers,

gardeners and agricultural students," and no doubt fills a need for a brief popular presentation. However, the diseases selected are on the whole a little more applicable to English than to American needs, though many of them are among our common troubles.

Milburn is secretary of agriculture and lecturer in agriculture, Lancashire County Council, England, and Bessey is professor of botany in our own Michigan Agricultural College. The latter's connection with the work has been largely confined to a prefatory note and a little of the subject-matter, especially in the introductory chapter dealing with the nature and classification of fungi and with fungicides. Bessey's connection with this book makes it the fifth on plant diseases that has been put forth by American authors in recent years, and we understand that a revision of one of these and a new one are now in preparation, showing the growing importance of vegetable pathology in this country. All of the books presented so far or under consideration are by men who have devoted more of their time to teaching than to the experimental side of plant pathology, especially as regards prevention of disease. The next author of a book on plant diseases should come from the latter class.

G. P. Clinton

PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES

The second number of Volume 2 of the *Proceedings of the National Academy of Sciences* contains the following articles:

1. *Personal Equation and Steadiness of Judgment in the Estimation of the Number of Objects in Moderately Large Samples:* J. Arthur Harris, Station for Experimental Evolution, Cold Spring Harbor, N. Y.

While there is no certain differentiation among the experimenters in personal equation, they differ distinctly in steadiness of judgment. The latter is conspicuous in contrast with the former in that it is unmistakably influenced by previous experience.

2. *Polypeptide-Hydantoins:* Treat B. Johnson, Sheffield Scientific School, Yale University.

The formulas for a large number of polypeptide-hydantoins are set up. Some of these substances have already been synthesized and methods for synthesizing others are being developed.

3. *Recent Explorations in the Cactus Deserts of South America:* J. N. Rose, Division of Plants, U. S. National Museum, Washington.

Large collections of cacti in South America have been made, including many species which have never before been collected and some which, though collected, have been poorly described or wrongly classified.

4. *On the Albedo of the Planets and Their Satellites:* Henry Norris Russell.

A table is given of the values finally derived for the albedo of the various planets and satellites. The values are in agreement with the current views of the constitution of the bodies. The value for the earth is intermediate between those of cloudy and cloudless planets.

5. *Quantum Relations in Photo-Electric Phenomena:* R. A. Millikan, Ryerson Physical Laboratory, University of Chicago.

So far as experiment has thus far gone Einstein's equation seems to be an exact statement of the energies of emission of corpuscles under the influence of light waves. Thus the correctness of the quantum theory and the reality of Planck's h are corroborated.

6. *The Chemical Activity of the Ions of Hydrochloric Acid Determined by Electromotive Force Measurements:* James H. Ellis, Research Laboratory of Physical Chemistry, Massachusetts Institute of Technology.

In this paper are presented accurate measurements of the electromotive force at 18, 25 and 35° of voltaic cells of the type H_2, HCl, $Hg_2Cl_2 + Hg$, with the acid-concentration varying from 0.03–4.5 normal. From the data are calculated the energy effects attending the reaction which takes place in such cells and those attending the transfer of hydrochloric acid in aqueous solution from one concentration to another. From these results are then calculated the chemical activities (or effective